



GARY R. HERBERT
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Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

October 30, 2013

Kelly Payne
Kennecott Utah Copper LLC
4700 Daybreak Parkway
South Jordan, Utah 84095

Subject: First Review of Notice of Intention to Commence Large Mining Operations, Kennecott Utah Copper LLC, Tailings Impoundment Facilities, M/035/0015, Salt Lake County, Utah

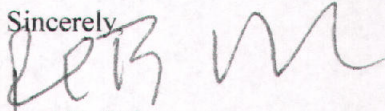
Dear Mr. Payne:

The Division of Oil, Gas and Mining has reviewed of the referenced Notice of Intention to Commence Large Mining Operations (Notice) which was received August 14, 2013. Thank you for organizing the submittal as per the R647 rules.

The comments are listed under the applicable rules headings. Please respond to this review using redline/strikeout text. When the Notice is determined technically complete, the Division will ask that you submit two clean copies of the complete and corrected plan. Upon final approval, both copies will be stamped approved, and one will be returned for your records.

The Division will be glad to meet with you or your representatives to clarify issues discussed in the review. Please contact Leslie Heppler at 801-538-5257 or me at 801-538-5261 if you have questions or would like to set up a meeting. You may also contact individual reviewer: Mike Bradley (mpb) at 801-538-5332, April Abate (aaa) at 801-538-5214, Lynn Kunzler (lk) at 801-538-5310, or Peter Brinton (pnb) at 801-538-5258. Thank you for your cooperation.

Sincerely,


Paul B. Baker
Minerals Program Manager

PBB: lah: eb

Attachment: Review

cc: Dan Hall, DEQ (dhall@utah.gov)

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**First REVIEW OF NOTICE OF INTENTION
TO COMMENCE LARGE MINING OPERATIONS**

**Kennecott Utah Copper, LLC
Tailings Impoundment Facilities**

**M/035/0015
October 30 2013**

General Comments:

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
1	General	The Division may generate additional comments based on the response to this review (no response required).	lah	
2	General	<p>The Division anticipates additional approvals will be required as listed below, and others not listed may also be needed. Following the Division's tentative approval and the public comment period, it may still be necessary to approve the revision conditionally based on whether other approvals are in place.</p> <ol style="list-style-type: none"> 1. Utah Division of Water Rights, Dam Safety, in compliance with R655-11. 2. US Army Corps of Engineers in compliance with Clean Water Act, Section 404. 3. Utah State Historic Preservation Officer in compliance with UCA 9-8-404. The Division anticipates this being coordinated through the Corps of Engineers. 4. Utah Division of Water Quality (UDWQ) - UPDES Permit number UT0000051. 5. UDWQ - UPDES General Construction Permit for disturbing greater than one acre. 6. UDWQ - Groundwater Permit no. UGW350011. 7. Utah Division of Air Quality - Air Quality Approval Order. 	lah	

R647-4-104 - Filing Requirements and Review Procedures

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
3	Page 4 2.	Paula Doughty is not listed on the Division of Corporations website as a member.	lah	

R647-4-105 - Maps, Drawings & Photographs

105.2 - Surface facilities map

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Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
4	Figure 4A	Key has 2 color blocks labeled "north impoundment." Please clarify.	mpb	
5	Figure 5A	Plan view details note 10:1 slopes; please add H:V.	lah	
6	Figure 8	Slopes are labeled as *V:1H which is metric units. Please be consistent with English units, which are H:V. Slope angles are incorrect.	lah	

105.3 - Drawings or Cross Sections (slopes, roads, pads, etc.)

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
7	Figure 10A	If known, please identify where these features will be installed or used on site plans	mpb	
8	Figure 10A & 10B	Notes refer to "DRW EN 6" and "DRW EN 1." Please provide these figures.	mpb	
9	Figure 10A	Sediment trap Section A - A should show riprap fully extending up the banks of the channel, as indicated in Plan View A-A section line.	mpb	
10	Figure 10A	Section B - B specifies 9" riprap. This is assumed to be the D ₅₀ . Normally the riprap layer should be two times the D ₅₀ for lower flows and increasing in thickness as flow increases.	mpb	
11	Figure 10A	Notes for sediment trap and inlet barrier diagrams state that accumulated sediment shall be removed and placed "in a stable area approved by the operator." This "stable area" should be located up gradient within the drainage area for the basin being cleaned so that there is minimal net loss of soils within that drainage area.	mpb	
12	Figure 10B	The stone check dam diagram identifies "Point B's." Designs should eliminate low points such as "Point B's." If using stone check dams, the tops of stone fill should tie into banks of ditch so that the top of the dam has a slight slope toward the center spillway of the dam.	mpb	
13	Figure 10B	Silt fences should be installed as specified by the manufacturer, not as directed by the operator.	mpb	
14	Figure 12	Watersheds are ill-defined. The watershed immediately south of the watershed identified as "Little Valley Wash Watershed" should be included as a contributor to the potential flows impacting the impoundments. If not, please explain why. The "Lee Creek Watershed" should extend up to Nelson Peak.	mpb	
15	Figure 15	Vertical exaggeration is extreme; the Division recommends the least amount possible that would still fit on a page.	lah	
16	Figure 15	Would be good to label as "current" typical section, and then add an "interim" section, and have a "final" typical cross section, which would show the staged approached.	lah	
17	Figure 15	Stratigraphy below the manmade tailings should show representative geology.	lah	
18	Figure 15	Perimeter embankment details should be shown, possibly as a detail insert.	lah	
19	Omission	As required by 105.3.18 and 110.4, include a map of the locations of potentially deleterious and acid-forming materials in the embankment and the storage area upon the completion of reclamation, consistent with descriptions in the text.	pnb	

R647-4-106 - Operation Plan

106.2 - Type of operations conducted, mining method, processing etc.

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
20	Page 9, para 2	The phrase “modified centerline” describes the north embankment construction method appropriately. The method used in constructing the south embankment is the “upstream” method (see Appendix N, page 39). Modify the text to indicate the correct tailings construction method for the south impoundment.	pnb	
21	Page 9, para 2	Briefly describe the function of this type of tailings embankment to drain water from the placed tailings (using the permeable starter dyke or other drain), and the role of the pump barge. Identify the importance of keeping sufficient beach between the berm and the decant pond, and provide a commitment to this effect.	pnb	

106.4 - Nature of materials mined, waste and estimated tonnages

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
22	General	The discussion of acid generation is based largely on the 1995 acidification report (Appendix J) which has good information, but which appears to be outdated. Appendix N indicates that extensive tailings characterization and water quality data collection and analyses have occurred over many years, and includes graphs and statistics. Please summarize these post-1995 findings to update conclusions regarding the extent of acid formation and other deleterious materials. For example, report any trends in collected data since the 1995 report.	pnb	
23	General	Discuss the formation and locations (interior/embankment) of acid conditions that have formed in the past, and the anticipated extent and locations of future acid generation. Appendix N is not cited here but states that spot acidification generally occurs within “several” years of placement.	pnb	
24	General	Figure 1 in the 1995 acidification report suggests that tailings in “new” and “archived” wells in the south impoundment have greater acidification potential than neutralization potential. Figure 1 also reports that cyclone “underflow” and “test fill” have approximately the same acidification potential (AP) and neutralization potential (NP), leaving their actual nature uncertain. Provide additional information to help explain anticipated acid generation in the tailings going forward. If wells exist in the north impoundment, please provide associated water quality and other data.	pnb	
25	General	Discuss typical pH and other water quality parameters of the transported tailings slurry, tailings pore water quality, and the water in toe drains and/or monitoring wells, since this information can be used to help characterize tailings. Appendix N and Section 107.4 (Operation Practices) contain some of this information, which should be summarized and/or moved to this section.	pnb	
26	General	Briefly discuss the storage, nature, and relative quantities of other materials besides tailings that are or will be disposed of in the impoundment (e.g. trash, molybdenum autoclave residues, water treatment and other processing sludge, etc.).	pnb	
27	Page 17 & 18	Table 106.4-2 and 106.4-3 are difficult to read. Please use the format on page 19 for table 106.4-5.	lah	
28	Page 16 Para 2	CaCO ₃ is shown as CACO ₃ . Please correct this typo and do a global search and replace to make the correction.	lah	
29	Page 16, para 2	Commit to update this section if ore or tailings characteristics change (e.g. such as for underground mining).	pnb	

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
30	Page 16, para 3	Explain briefly what is meant by the term “test fill” as opposed to tailings.	pnb	
31	Page 16, para 3	In the 1995 report, the acronym “ABA” (apparently equivalent to NNP, or net neutralization potential) was used. Where appropriate, please change the term “ABA” to “NNP”, consistent with current Sobek method terminology.	pnb	
32	Page 16, para 3	By common current acid base analysis (ABA) interpretations, mine waste having an NNP value between +/-20 tons CaCO ₃ per kiloton material and a neutralization potential ratio (NPR) between 1 and 3 is categorized as “uncertain” with regard to its potential for acid-formation. Without an additional basis, the current categorization of the south impoundment tailings as “moderately neutralizing” is not consistent with the provided ABA information, since the NNP values are less than +10 tons CaCO ₃ per kiloton material, and since the NPR value calculated from the provided NP and AP is less than 2. Provide any additional basis for the “moderately neutralizing” categorization, or re-categorize the south tailings.	pnb	
33	Omission	Provide summarized information about whether samples were taken from new or old tailings, and identify location information for tailings sampled in-situ (including typical depths if not sampled at the surface).	pnb	
34	Omission	Summarize the sampling, testing, and conclusions of both past and any ongoing kinetic testing.	pnb	
35	Page 17, para 1	Change the term “NNP” to “NP” in this instance, consistent with Sobek method terminology.	pnb	
36	Page 17, para 1	The word “oxygen” in the following statement appears incorrect: “...Waste rock used in construction of the south embankment is encapsulated with oxygen.” Correct as needed, and identify whether deleterious waste rock is used in the south embankment.	pnb	
37	Page 17, para 1	The statement that “saturated tailings typically are neutral pH” is not necessarily accurate for all saturated tailings. Unless saturated tailings at this impoundment are known to be neutral, correct the statement.	pnb	
38	Pages 17-18, Tables	Identify in the table titles the general locations of the sample analyses displayed in Tables 106.4-2 and 106.4-3 (south impoundment, north impoundment, etc), and briefly summarize the tabulated information and any conclusions reached.	pnb	
39	Page 18, para 1	Provide north impoundment geochemical characterization reporting (including 2010 embankment characterization) in an appendix, and summarize and reference it here.	pnb	
40	Page 18, para 1	As with the south impoundment tailings, the categorization of the north impoundment tailings as “net neutralizing” is not consistent with the provided ABA information, assuming current ABA interpretation. Change or provide additional basis for this categorization.	pnb	
41	Page 18, para 1	Identify whether samples were taken from new or old tailings, and identify location information for sampled tailings (including depth information).	pnb	
42	Page 19, Table 4	Sulfur, sulfide sulfur (if measured), and carbon percentages are typically reported with ABA data. Please report this information as well.	pnb	
43	Page 19, Omission	Provide information on the nitrates and cyanide in tailings pore or decant waters, as appropriate.	pnb	
44	Page 19, para 1	Identify the general locations and number of tailings samples that were analyzed, both for total metals chemical analysis, as well as for SPLP samples for metals leaching.	pnb	

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
45	Page 19	Discuss the findings from Table 106.4-5. Should the placed and future tailings be considered deleterious because of metals?	pnb	
46	Page 19, Table 5	Please clarify in the title that Table 106.4-5 refers to north impoundment tailings data. Also, the SPLP leached concentrations are concentrations (mg/L) in leachate, not in tailings.	pnb	
47	Page 19, Table 5	Total dissolved solids (TDS) and both initial and final solution pH are reported in SPLP tests. Sulfate may also be tested. Provide this data as possible.	pnb	

106.8 - Depth to groundwater, extent of overburden, geology

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
48	Appendix B	On Figure 4.1, what is the geology and hydrology in the area around the phase 2 pump barge access dike? The "study design sections" in Appendix B are used for stability analyses and show the CPT data and associated geologic interpretation. The Division is requesting the CPT data and associated geological interpretation in the area of the phase 2 pump barge access dike area.	lah	
49	Page 31	It is unclear if URS, 2012a (which is noted as part of Appendix L) will be included in Appendix L or if Appendix L will only be the approval letter from DWQ.	lah	

106.9 - Location & size of ore, waste, tailings, ponds

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
50	Page 35 para 1	The Division does not require seismic design criteria but highly recommends advancing the schedule of the engineered structure(s) to maintain stability during a seismic event.	lah	

R647-4-107 - Operation Practices

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
51	Page 40, para 3	Rewrite to state "clay from the existing toe ditch will be used for the new toe ditch of the northeast impoundment" if this is what is meant.	pnb	
52	Pages 42-43 (on 43 only para 1)	Section 107.4 would typically be used to discuss operation practices for handling and storing deleterious materials during operations. Tailings acidification potential and tailings reclamation are more appropriate to discuss in sections 106.4 and 110, respectively. Please move text to the most appropriate sections.	pnb	
53	Page 43, para 1	Correct the sentence beginning with "A small percentage of tailings...", since acid formation is <u>less</u> likely to happen with saturation and positive NNP.	pnb	
54	Page 43, para 1	Based on standard ABA interpretation of the provided data, it is uncertain whether the tailings impoundment will ultimately be acid forming or not. Some modification of the text is needed. This discussion is more appropriate to include in 106.4.	pnb	
55	Omission	Provide a simple tailings impoundment water balance, with estimated flows associated with its individual components. While possibly not up to date, a water balance discussion is included in Appendix J.	pnb	

R647-4-108 - Hole Plugging Requirements

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
56		Although not required by rule, please add a brief discussion on the plugging of monitoring and other holes which are excluded in the rules, i.e. holes less than 2-½" in diameter.	lah	

R647-4-109 - Impact Assessment

109.1 - Impacts to surface & groundwater systems

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
57	Omission	No groundwater monitoring wells are proposed for the shallow and principal aquifer for the northeast expansion area. Both the shallow and principal aquifer indicate a potentiometric groundwater surface flowing toward the north/northeast, but neither the text nor the figures in the report propose any monitoring downgradient of the expansion area. Several well couplets are already in place monitoring the two aquifers located along the outer embankment of the existing tailings (adjacent to I-80 and the Great Salt Lake). It is also unclear if the existing wells, NET1385 and NET1381, series are to remain or will be decommissioned as a result of the expansion. Several artesian wells were shown in the vicinity of the northeast expansion area on Figure 3, but they are all listed as "to be plugged". Could these wells, especially the ones along the perimeter, be completed as monitoring wells for the northeast expansion?	aaa	
58	Omission	Please address impacts to water rights in the vicinity and down gradient of the northeast expansion area. According to a Division of Water Rights (DWRi) web search, most of the underground water rights are owned by Kennecott, but some are not. Please evaluate impacts and include a statement in this section of the report.	aaa	
59	Omission	Identify any impacts (and mitigation of any impacts) to surface water that are associated with acid-forming and otherwise deleterious tailings (such as those leaching significant metals).	pnb	
60	Omission	Identify any impacts (and mitigation of any impacts) to groundwater that are associated with acid-forming and other deleterious tailings (such as those leaching significant metals).	pnb	
61	Omission	Discuss any potential post-reclamation impacts, such as with discharges and any acidification. Discuss post-reclamation mitigation of such impacts.	pnb	
62	Omission	Discuss the progress of tailings dewatering and consolidation for existing tailings. Identify any planned efforts to reduce drying time (enhanced evaporation, etc).	pnb	
63	Page 47, para 4	The application says it is not anticipated that the Great Salt Lake will be impacted since there are no impacts to groundwater. Identify any impacts associated with surface water discharges to the lake, and any impacts to other surface waters. Provide or refer to a discharge permit with standard information about decant pond water quality and water that is discharged from Outfall 012 (e.g. class type, typical and maximum gallons/minute, pH, metals, TDS, sulfate, and, if applicable, nitrates and cyanide concentrations). Appendix N has some information on water quality.	pnb	

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Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
64	Page 48, para 4	Clarify whether the unconfined areas of the shallow aquifer in the vicinity of the impoundment (discussed in 106.8) are flow paths for potential contamination. Identify any past or future impacts.	pnb	

109.3 - Impacts on existing soils resources

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
65	Page 50	Provide a reference to section 106.5 and 106.6, since they discuss unsuitability of soils.	pnb	
66	Page 50	Refer to plans in 110 that discuss mitigation of expected acidic patches in tailings that would otherwise affect revegetation success.	pnb	

109.5 - Actions to mitigate any impacts

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
67	Omission of section, but not mitigation actions	Many actions to mitigate negative impacts in section 109 have been addressed under each specific issue (pages 46-56). Please include the phrase, "to mitigate impacts. . ."	lah	

R647-4-110 - Reclamation Plan

110.2 - Roads, highwalls, slopes, drainages, pits, etc., reclaimed

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
68	Page 58 bullet 5	Include reference to sections of the Notice that define Types 1, 2 and 3, such as Section 110.5.3	lah	
69	Page 59 para 2	Include more detail on the minimum quantity of facilities to be removed. Refer to surety sheets for the details	lah	
70	Page 60, para 2	Provide an estimate of the amount of time required for the final tailings surface to dry adequately to enable revegetation. Discuss whether a pond or wet area is expected to remain long-term. Is significant ponding of precipitation in the impoundment anticipated post-reclamation?	pnb	
71	Page 60, Para 3	Figure 9 doesn't contain any cross sections.	lah	
72	Page 63, para 1	Please correct the typo "UUDOGM."	lah	
73	Page 63	This page includes a discussion of soil amendments. The Division recommends a commitment to use the best available technology at the time of reclamation followed by a list of possible methods to be used emphasizing biosolids.	lah	

110.3 - Description of facilities to be left (post mining use)

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
74	Omission	Identify the ditches that will remain after mining.	pnb	

110.4 - Description or treatment/disposition of deleterious or acid forming material

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
75	Omission	Covers are commonly used during reclamation of tailings to minimize oxidation, infiltration, and exposure of tailings, and to provide a growth medium. Explain why a cover is not proposed for the interior of this tailings impoundment. Also identify any anticipated effects of the embankment soil layer on acid-forming and deleterious materials present in the embankment.	pnb	
76	Page 60, para 1	Provide details about the possible storage of acid generating materials at the final decant pond area (mentioned in 110.2.1). What type of materials would be stored and under what conditions? Will they be buried or placed at the surface? This area will need to be shown, together with other potential storage areas for acid -forming and any other deleterious materials, on the deleterious materials storage map (see 110.4). Also identify any other non-tailings, deleterious materials that may be stored in the impoundment.	pnb	
77	Page 65, para 1	Discuss why these NNP and NPR values have been selected as appropriate. NNP and NPR values are typically higher than those reported if acid is going to be prevented with certainty.	pnb	

110.5 - Revegetation planting program

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
78	Page 68: para 1&2	<p>Please provide a list of tree and shrub species that will be planted, including the overall density (number of plants per acre) of the plantings. It is suggested that a target planting density be between 500 and 1000 plants per acre. Species to consider include staghorn sumac, skunkbush sumac, woods rose, hackberry, velvet ash, Fremont cottonwood, Utah serviceberry, blue elderberry, black walnut, golden currant, chokecherry, coyote willow, and black locust. Also, the Division suggests that the 25 acres/year of planting be made in several plots of various sizes and shapes (ranging in size from 1 to 5 acres). The ratio of each species should be varied in each plot, and some species may not be used in all plots.</p> <p>The Division requests that the planting plan be shown in table format. The Division also suggests that if possible, trees and shrubs be planted primarily on the exterior of the impoundments to enhance the viewshed.</p>	lk lah	
79	Page 63 para 1	Figure 9 does not refer to the different "types"(type 1, 2 or 3)	lah	

R647-4-112 – Variance

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
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Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
80	Page 71	No variances requested - no further action is needed	lah	

R647-4-113 – Surety

Comment #	Sheet/Page/Map/Table #	Comments	Initials	Review Action
81		Please submit surety calculations in the format provided on the Division's web site. A copy of the summary sheet should be included in the text	lah	